US Army Corps of Engineers®
Engineer Research and Development Center

BNOISE2: Blast Noise Impact Assessment

Problem

Military training and testing operations can cause significant noise impact on the surrounding area. Community response to noise in the form of complaints and/or political pressure, legal action, and damage claims, all hamper mission execution. One element of an effective noise management strategy is the ability to accurately forecast and assess community noise exposure. Evaluation of impacts of weapons noise on humans and animals requires knowledge of both physiological and psychological reactions to weapons noise. Assessment of these effects in any given scenario requires algorithms to predict the noise field around the weapon, from small to large distances. Army-developed BNOISE software—distributed and supported by the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)—enabled calculation and display of blast noise exposure contours resulting from specified operations involving large guns and explosive charges. The Army identified a need to upgrade BNOISE to improve its noise-assessment capability.

Description of Research

BNOISE2 research is developing a IBM-compatible, PC-based microcomputer application that will run in a Windows® XP, Windows® 2000 (or earlier Windows® versions) environment, and that enables calculation and display of blast noise exposure contours resulting from specified operations involving large guns and explosive charges. BNOISE2 will offer significant improvements over its software predecessor, BNOISE: improved propagation algorithms, updated weapons source models, the effects of land-water boundaries and terrain, and a user-friendly graphical user interface. The software will consider type of weapon and ammunition, number and time of rounds fired, range attributes, weather, and assessment procedures and metrics. It will account for spectrum and directivity of both muzzle blast and projectile sonic boom, which facilitates accurate calculation of propagation and frequency weighting. Source model parameter values will be based on empirical data. The propagation algorithms will be based on sophisticated calculations and experimental data. Available metrics will include sound exposure level (SEL) and day-night noise level (DNL).

The BNOISE2 interface will maximize user productivity. The program will feature a user-friendly point-and-click graphical user interface, pull down menus, and on-line help. Information regarding the types of weapon and ammunition, the locations at which the firing takes place, the number of shots during day- and night-time, etc., will reside in an activity table. Required information regarding the guns and ammunition (source models) and ranges will be stored in databases and chosen from pick lists. The

BNOISE2 will enable calculation and display of blast noise exposure contours from operations involving large guns and explosive charges.

program is designed to include a library of database records, including weapons, metrics, and frequency-weighting schemes. A propagation algorithm will be used to calculate sound levels at each node of a user-defined geographical grid. The resulting array of noise level values may then be converted to contours and prepared for display by existing software known as NMPlot (developed for the U.S. Air Force and the U.S. Federal Aviation Administration). This software will enable display of noise contours, including a zoom control for viewing various levels of detail, and the capability to print map overlays. Results may be exported in Environmental Systems Research Institute, Inc. (ESRI) “Shape” (SHP) or Autodesk “Drawing eXchange Format” (DXF) file formats. This unique software is currently being beta-tested at USACHPPM.

Expected Products

The research will produce BNOISE2, an Army-developed PC-based microcomputer application that runs in a that will run in a Windows® XP, Windows® 2000 (or earlier Windows® versions) environment. The program will include a library of database records, including weapons, metrics, and frequency-weighting schemes.

Potential Users

BNOISE2 will be useful to all of the military services. The program will be specifically designed for use by installation planners and managers who are responsible for training and testing operations (e.g., firing ranges), but will also find application within the private sector for applications that involve the use of explosives.

Projected Benefits

BNOISE2 will enable improved quantification of blast noise impact, making the program useful to all of the Services, and also to private sector activities that involve the use of explosives. This product will facilitate noise management and planning for existing and new ranges. It will also help avoid noise complaints that can lead to curtailment or closure of training and testing facilities.

Program Manager

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